20.11: Solving Quadratic Inequalities

Recall: Solving an inequality is very similar to solving an equation.

* if you (x) or (÷) by a negative, you must reverse the inequality

Ex: $\frac{-2x^2}{-2} + \frac{4x}{-2} > \frac{0}{-2}$ ↓

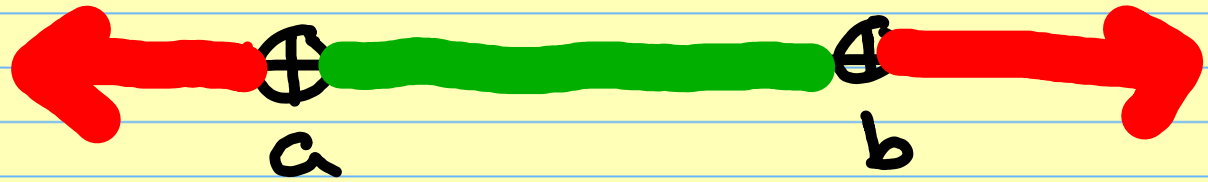
$x^2 - 2x < 0$

Solving Quadratic Inequalities

1) Set the inequality to zero
   - $2x^2 > 4x \Rightarrow 2x^2 - 4x > 0$

2) Ignore the inequality and solve the quadratic equation by:
   (i) factoring (GCF, DOTS, Trinomial)
   or
   (ii) quadratic formula: $x = \frac{\quad}{\quad}$
   or
   (iii) Complete the square
   $ax^2 + bx = c$
   * a must be 1.

3) Plot the 2 solutions on a number line and test to determine if you shade between or outside



* you can memorize this

ax^2 must be (+)

$ax^2+bx+c > 0 \Rightarrow$ shade outside

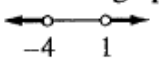
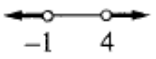
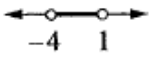
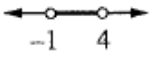
$ax^2+bx+c < 0 \Rightarrow$ shade between

Ex: Find the solution set of:

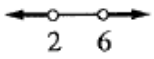
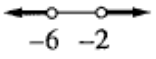
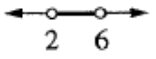
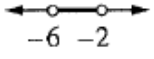
$x^2 + 2x > 8$

Pg 971:
3-33 (:3)
skip 24

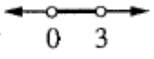
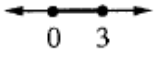
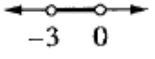
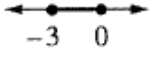
3. Which is the graph of the solution set of $x^2 + 3x - 4 > 0$?

(1)  (2)  (3)  (4) 

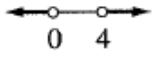
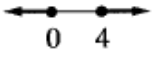
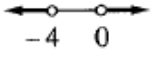
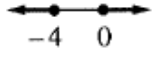
4. Which is the graph of the solution set of $x^2 - 8x + 12 < 0$?

(1)  (2)  (3)  (4) 

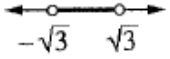
5. If $x^2 - 3x \leq 0$, which is the graph of the solution set?

(1)  (2)  (3)  (4) 

6. The graph of the solution set of $x^2 - 4x \geq 0$ is

(1)  (2)  (3)  (4) 

7. Which of the following is a quadratic inequality whose solution is graphed at the right?



(1) $x^2 - 3 < 0$ (2) $x^2 - 3 > 0$
(3) $x^2 - 3 \leq 0$ (4) $x^2 - 3 \geq 0$

In 8–23, for each quadratic inequality: **a.** Write the solution set. **b.** Graph the solution set.

8. $x^2 - 16 < 0$ **9.** $x^2 - 25 > 0$ **10.** $2x^2 - 8 > 0$ **11.** $x^2 - 4x \geq 0$
12. $x^2 + 7x \leq 0$ **13.** $x^2 - 7x + 10 < 0$ **14.** $x^2 - x - 6 > 0$ **15.** $x^2 - 5x - 24 \leq 0$
16. $x^2 + 8x + 7 \geq 0$ **17.** $x^2 > 8x + 20$ **18.** $x^2 + 2x < 15$ **19.** $x^2 + 27 < 12x$
20. $4x^2 - 9 \geq 0$ **21.** $2x^2 - 11x + 5 \geq 0$ **22.** $3x^2 + 10x \leq 8$ **23.** $9x^2 + 4 \leq 15x$

24. The quadratic inequality $x^2 - 14x + 49 \leq 0$ has a solution set consisting of only one number.
a. Find the solution set. **b.** Explain why the solution set is limited to one number.
25. Explain why the solution set of $x^2 + 16 < 0$ is empty.
26. Explain why the solution set of $x^2 + 9 > 0$ is the set of all real numbers.

In 27–34, write the solution set of each quadratic inequality.

27. $x^2 - 6x + 9 > 0$ **28.** $x^2 - 6x + 9 < 0$ **29.** $x^2 - 6x + 9 \geq 0$ **30.** $x^2 - 6x + 9 \leq 0$

21. $2x^2 - 11x + 5 \geq 0$

33. $4x^2 + 1 \leq 4x$